

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-14 were pending. By the present response, claims 1, 4-8, 11-12 and 14 have been amended. Thus, upon entry of the present response, claims 1-14 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: page 2, lines 1-5; and the original claims.

Entry of the forgoing is appropriate pursuant to 37 C.F.R. §1.116 for at least the following reasons. First, the amendments raise no new issues that would necessitate further search and/or substantive reexamination. Second, the amendments place the application in better form for an appeal.

OBJECTION TO THE SPECIFICATION

The specification stands objected to on the grounds set forth in paragraph 1 of the Official Action. By the present response, applicants have amended the claims in a manner which is believed to address the above-noted objections. Thus, reconsideration and withdrawal of the objections is respectfully requested.

CLAIM OBJECTIONS

Claims 1, 4-8, 11 and 13 are objected to because of informalities. The claims have been amended in a non-narrowing manner to address the objections. Thus, reconsideration and withdrawal of the objection is respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over WO 0154971 A1 to Varis (hereafter "Varis") in view of NO 10907 (hereafter "Parsons '907") on the grounds set forth in paragraph 4 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counterrotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification). This form of cavitation is sometimes referred to as "sheet cavitation." An arrangement constructed according to a first aspect of the present invention is set forth in claim 1. Claim 1 recites:

1. *Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing*

each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller and that the flow plates are radially projecting from the cap.

According to a further aspect, an arrangement formed according to the principles of the present invention is set forth in claim 11. Claim 11 recites:

11. Arrangement in a counter rotating propulsion system, comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, wherein each of the propellers have a hub with a cap, whereby the hub and cap associated with the forward and aft propellers are arranged opposing each other, at least two equally distributed flow plates are arranged on the cap of the forward propeller and the flow plates are radially projecting from the cap.

According to still another aspect, an arrangement constructed according to the principles of the present invention is defined by claim 12:

*12. An arrangement comprising:
a thruster rotatable about a vertical axis comprising
an aft propeller, a first hub and a first cap; and
a forward propeller, and a second hub and a second
cap associated with the forward propeller, the second cap
having a diameter, the second cap comprising a plurality of
equally spaced flow plates projecting from the second cap in
a radial direction with no inclination and without extending
beyond the diameter of the second cap;
wherein the aft propeller and the forward propeller
have opposite directions of rotation;
wherein the first cap and the second cap are arranged
opposing each other and are spaced apart; thereby defining
a separation zone; and
wherein the flow plates are constructed and arranged
to eliminate cavitation in the separation zone when the aft
propeller is not co-axial with the forward propeller.*

The proposed combination of *Varis* and *Parsons* '907 fail to render obvious the arrangements defined by the claims of the present application as set forth above.

Varis is directed to a CRP propulsion system for a marine vessel. Such propulsion systems are discussed in the background of the present application. The present invention is based on an effort to improve the performance and reliability of such propulsion systems by minimizing cavitation effects unique to the operation of these relatively complex propulsion systems.

In contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons* '907 is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons* '907. Thus, for example, the disclosure of *Parsons* '907 is of no value to one of ordinary skill in the art seeking to minimize the effects of the aforementioned "sheet cavitation" as well as the interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the teachings of *Parsons* '907 as being relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms. In other words, it would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons* '907. It is respectfully submitted that the

rejections based upon modification rooted in hindsight, and not the objective teachings of the *Varis* and *Parsons* '907 references.

Moreover, since *Parsons* '907 involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of *Parsons* '907 as to whether one should modify the forward or aft propeller of a CRP system such as that described by *Varis*.

For at least the reasons noted above, it would not have been obvious to have combined the *Varis* and *Parsons* '907 references in the manner suggested. Thus, the rejection should be withdrawn.

Claims 1-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Varis* in view of GB 9792 (hereafter "*Parsons* '792") on the grounds set forth in paragraph 5 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The combination of *Varis* with *Parsons* '792 are traversed upon the same grounds set forth above in connection with the rejection based on *Varis* and *Parsons* '907, and all of the remarks above are incorporated herein by reference. As acknowledged in the grounds for rejection, the disclosure of *Parsons* '792 and *Parsons* '907 appear to be substantially the same. Thus, for the same reasons noted above, it would not have been obvious to one of ordinary skill in the art to have combined the teachings of *Varis* with *Parsons* '792 in the manner suggested. In addition, *Parsons* '792 provides no guidance whatsoever with regard to which propeller structure (i.e., the forward or aft propeller) of a CRP system should be modified in an effort to eliminate or mitigate the adverse consequences of cavitation. Thus, the rejection should be withdrawn.

CONCLUSION

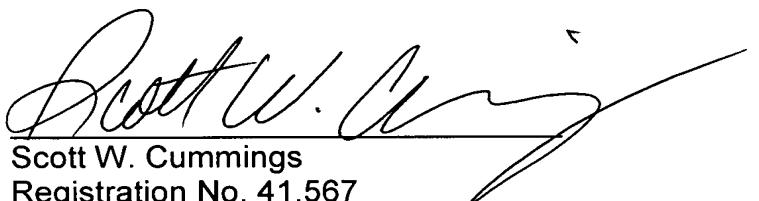
From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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